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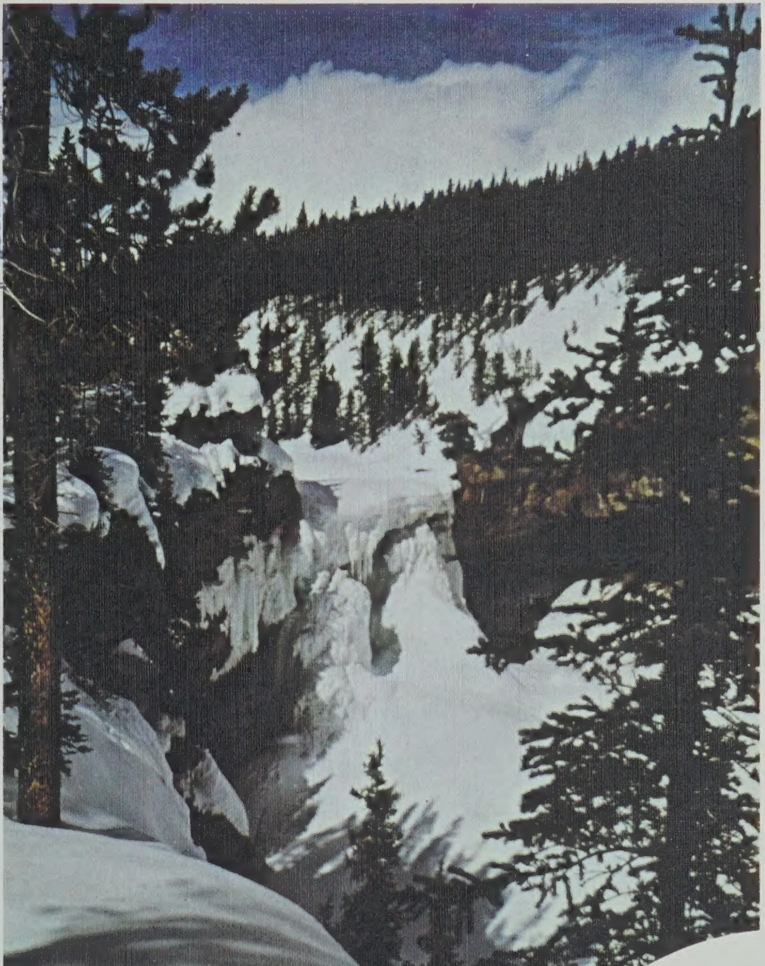

PROCTER & GAMBLE CELLULOSE, LTD.
GRANDE PRAIRIE

Kakwa Falls is a scenic area located approximately 190 km. southwest of Grande Prairie. Today through the efforts of Procter & Gamble Cellulose, Ltd. other local organizations, individuals and the Provincial Government, Kakwa Falls is now centred in the new 245 square mile Kakwa Provincial Park.

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INTRODUCTION

This brief presents Procter & Gamble's approach to managing the forests delineated in its Forest Management Agreement with the Province of Alberta. It also outlines the economic impact of its operations on the local communities and highlights concerns that the Company has with respect to forestry operations in Alberta.

Procter & Gamble Cellulose, Ltd., the Alberta-based Company (hereafter referred to as Procter & Gamble, P&G, or the Company), has as its basic goals the following:

1) to ensure that this valuable forest resource owned by the citizens of Alberta is renewed and enhanced to meet the multiple needs of the public;
2) to provide a continuous supply of wood to the pulpmill and to other potential facilities;
3) to have a positive impact on the citizens of Alberta in general and Grande Prairie in particular;
4) to provide a fair return on the investment made by the Company.

Procter & Gamble strongly supports a multiple use concept of forest management and recognizes the needs of other users on the Forest Management Area (F.M.A.). In addition, P&G has placed considerable emphasis on protecting the land base, critical wildlife areas, fish habitat, and water quantity and quality, as well as recognizing aesthetic values in planning and carrying out harvesting and related operations.

Following a brief history of Procter & Gamble, all aspects of forestry operations at P&G in Grande Prairie will be outlined commencing with planning activities and following with sections on

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road construction, timber harvesting, and reforestation/silviculture. In this manner, you will be brought full circle relative to P&G's management of Alberta's forests on a sustained yield basis. Concerns with respect to the terms of reference of these hearings will be presented in the context of the brief to facilitate a thorough explanation and understanding of each point.

HISTORY

The Procter & Gamble Company is a multi-national firm founded in 1837 as a partnership between a candle maker, Mr. Procter, and a soap maker, Mr. Gamble, in Cincinnati, Ohio. From this rather modest beginning grew a company that in the past year had sales in excess of 7 billion dollars and employed approximately 53 thousand people. It is owned by approximately 101 thousand shareholders from all over the world, many of whom are the employees themselves.

The Procter & Gamble Company entered Canada in 1915 with the opening of a plant in Hamilton, Ontario. Additional facilities were erected in Point Claire, Quebec and in 1975 a new disposable diapers plant was opened in Belleville, Ontario. The corporate headquarters of The Procter & Gamble Company of Canada, Limited are in Toronto.

The Procter & Gamble Company has been involved in the pulp and paper business for more than 50 years. In the early 1920's, The Buckeye Cellulose Corporation (a wholly owned subsidiary) commenced production of a very high quality cellulose pulp from the short fibres grown on the seed of the cotton plant. In 1954, a kraft pulpmill was built in Foley, Florida. Paralleling this development in pulp, The Procter & Gamble Company acquired in the mid 1950's a small tissue company, Charmin Paper Products, which has grown from one small plant to a combined total of two sulphite pulp plants and six tissue converting facilities in the United States. There are also converting facilities in Germany and Canada. In addition, The Procter & Gamble Company recently announced commencement of feasibility studies for a new pulpmill in the southeastern United States. Research facilities located in Cincinnati, Foley, Grande Prairie, and Memphis provide technical support and developmental work to all plants and woodlands for existing and potential products.

The Procter & Gamble Company of Canada, Limited formally entered Alberta in January of 1969 with the signing of a Forest Management Agreement with the Province of Alberta. This Agreement enumerates conditions under which The Procter & Gamble Company of Canada, Limited is permitted to harvest timber from approximately 5,600 square miles of Crown forest land, located in the vicinity of Grande Prairie, to supply the pulpmill.

In December of 1970, The Procter & Gamble Company of Canada, Limited announced that the pulpmill would be constructed and operated by Procter & Gamble Cellulose, Ltd.; timber harvesting operations commenced in January of 1973 on the F.M.A., and by August of the same year, pulp was shipped to customers from the new mill. The Grande Prairie pulpmill, which has run continuously since start-up in 1973, produces more than 290 thousand tons of pulp annually from approximately 1.2 million tons of wood for customers located in the eastern and mid-western United States, Canada, and abroad. Additional information may be found in Appendix I outlining the effects of the pulpmill on the environment.

ECONOMIC EFFECTS

Since the decision was made in December of 1970 to construct the pulpmill near Grande Prairie, a significant, on-going impact has been made on the economy of the local area. Approximately 50 percent of the more than 100 million dollar construction cost was spent in Alberta and over 90 percent was spent in Canada. During construction, the 1,800 workers, many of them from the Peace Country, spent a significant portion of the 1.5 million dollar average monthly payroll in the immediate area.

Procter & Gamble Cellulose presently employs approximately 800 permanent people. An additional 300 individuals provide supportive contract services such as log hauling, gravel hauling, mill maintenance, security, food catering, and chip hauling. Including the families of all those mentioned, approximately 4,000 people are directly affected by the pulpmill.

Wages paid to Company employees totalled approximately 19 million dollars in 1976. These earnings have led to increased expenditures in all areas of the economy and have stimulated the local business community accordingly. Besides wages, Procter & Gamble spent 22 million dollars in 1976 on goods and services with over 250 local firms.

Procter & Gamble provides further input into the local economy through property taxes, in excess of 1.5 million dollars in 1977. As a resident of the County of Grande Priarie, the Company comprises approximately 50 percent of the total assessment in the County. On a broader basis, approximately 40 percent of taxable profits is paid in the form of corporate income tax to the federal and provincial governments. Since construction commenced on the mill, the general assessment of property in the City of Grande Prairie has risen

approximately 50 percent. A significant portion of this increase can be attributed to the Company's presence in the community.

Since 1973, the City of Grande Prairie's population has increased 16 percent, while the County of Grande Prairie has experienced an increase of 9 percent during the same period, both rates well above the national average.

COMMUNITY INVOLVEMENT

The community and surrounding district have benefited through several programs undertaken by Procter & Gamble. Several hundred thousand dollars have been committed and invested in recreation programs and facilities in Grande Prairie and the surrounding area. Some of the many projects undertaken with these monies include children's libraries, playground equipment, upgrading community halls, a scholarship program and donations to local groups. On the F.M.A. three recreation areas have been developed - a picnic area and scenic lookout at Chinook Ridge, a picnic area and campground at Bald Mountain Creek, and a picnic area, campground, boat launching facilities, and beach at Spring Lake.

Recognizing its considerable impact on the community, Procter & Gamble has consistently worked with all government bodies to ensure that adequate services are supplied to meet the ever-increasing demands. The Company also encourages its employees to take an active role in community activities; Chamber of Commerce, School Boards, Air Cadets, United Fund, and many others.

LAND TENURE

In Canada, over 90 percent of the forest land is owned by the public with each province responsible for its forest land. Provincial governments, through their forest policies, use a variety of methods to allocate timber to commercial operators. Most of these agreements with timber operators have as principal tenants varying degrees of security of long term cutting rights, company reforestation responsibilities, and the payment of fees and royalties to the province. Currently, many of the provinces are reviewing basic forest policy philosophies with the intent of re-structuring and updating them.

In Alberta, companies wishing to construct capital-intensive facilities such as pulpmills or large integrated sawmill complexes obtain, through a competitive bidding process, a forest management agreement from the government for a 20-year period with 20-year renewable options. This agreement gives a company the exclusive right to manage a specified area for establishing, growing, and harvesting timber thereon on a perpetual sustained yield basis in accordance with its terms. In return, forest management agreement holders are fully responsible for reforesting all cutovers to government standards and also pay stumpage royalties and other fees which are commensurate with the recognized costs to manage and regenerate the forests to specified government standards.

It is appropriate to guarantee long term tenure rights to companies provided that negotiated management, harvesting, and reforestation conditions are met. At recent meetings of the Canadian Pulp & Paper Association, provincial forest policies have been reviewed, and from both government and industry points of view, it appears that Alberta's approach is currently one of the most appropriate to ensure the protection and enhancement of the forests for present and future generations to use and enjoy. This is substantiated in part by the relatively minimal backlog of cutover forest lands in Alberta which

have not been successfully regenerated, unlike many other provinces. This backlog should be further reduced upon completion of the new Provincial Tree Nursery at Smoky Lake in early 1979. In summary, P&G believes that Alberta has the best system of forest management policies in Canada, and major changes are not warranted.

MULTIPLE USE

In the past few years, more and more Albertans are enjoying a variety of recreational pursuits in our forests. This is due in part to increased amounts of leisure time, higher standards of living, and the development of better roads, many of which have been built by industry and provide access into the forests. Increased use has developed greater public awareness of industrial uses of the forests, and consequently has prompted some negative public reaction to timber harvesting and other resource developments. Subsequently, the public has pressured the government to set aside additional forest land for parks where timber harvesting is excluded and to develop more stringent environmental safeguards.

It is good to see Albertans taking advantage of the outdoor resources that are available to us. Procter & Gamble strongly endorses a multiple use forest policy that recognizes the need for other values such as recreation, fish and wildlife protection and enhancement, watershed protection, etc., to be realized in conjunction with timber production and utilization. Lately, however, the Alberta government has adopted the approach of delineating large areas of the Eastern Slopes for predominantly single use concepts. Specifically, Kakwa Provincial Park, encompassing approximately 250 square miles, was announced in early 1975, as was the Kananaskis Park, which has subsequently been incorporated into the Kananaskis Country Recreation Plan encompassing approximately 2,000 square miles. The Kakwa Falls proposed park development is located in the southwest corner of P&G's F.M.A. This proposed park area is about to be withdrawn from the F.M.A., although to date no detailed development plans for the park have been announced.

In addition to these park announcements, the government recently released a policy paper on resource management of the Eastern Slopes. This was developed in response to the Environment Conservation

Authority's hearings into land use and resource development in the Eastern Slopes in which strong public pressures for increased recreational facilities and watershed protection were evidenced. In this policy, the entire Eastern Slopes has been divided into zones which broadly identify land areas that will be managed for various primary uses. The zones differentiated were prime protection, critical wildlife, special use, general recreation, multiple use, agricultural, industrial and facility. In none of these zones is timber harvesting recognized as a priority use, even though P&G's Forest Management Agreement clearly identifies it as such. On the F.M.A. almost every major river valley has been zoned either for general recreation or critical wildlife in which logging is restricted. This total restricted area is of concern to P&G since approximately 8 percent of the F.M.A. is included.

Procter & Gamble supports the setting aside of specific areas for camping, picnicking, and other related recreational pursuits, and to this end has developed several recreational facilities on the F.M.A. Chinook Ridge on the Two Lakes Road provides a picnic area at a scenic lookout, while Bald Mountain and Spring Lake campsites are developed extensively and provide a cooking shelter, individual sites for camping, excellent well water, playground equipment for children, and numerous other amenities. However, the Company believes that these areas should be limited in size and that more general recreational pursuits such as hunting, fishing, and hiking should be one of the multiple uses including timber harvesting on the F.M.A.

To date, P&G has been able to successfully work with the Alberta Forest Service (A.F.S.) and the Fish and Wildlife Division to design acceptable harvesting patterns that will ensure the continued production of wildlife. This approach is far better than excluding large areas from timber production solely for wildlife production

since most wildlife species require the young browse found on recent cutovers or burns for food. This food supply is not found in a dense, mature forest.

The Company believes that this multiple use concept is the best use for the F.M.A. today, and provides the best assurance of available forest resources for future generations. Young regenerated stands developed after timber harvesting are healthy and vigorous, while large timbered areas reserved solely for recreation and/or wildlife become over-mature, decadent, and die, providing an ideal environment for insect infestations and/or forest fires. These enemies of the forest may destroy not only the reserved areas, but adjacent stands of young timber as well. Additionally, as these stands grow old and fall down, they are often no longer attractive and useful for the reasons they were originally reserved.

P&G contends that the government has more than amply responded to recent public concerns and pressures for additional major recreational areas and environmental protection, and that no additional single purpose zoning of large areas on the Eastern Slopes should occur. Rather, more emphasis should be placed on pursuing the multiple use concept to the fullest.

WOODLANDS ORGANIZATION

1. General

The stewardship of approximately 5,600 square miles of Crown forest land is regarded by Procter & Gamble as a major responsibility to the citizens of Alberta. To fulfill this responsibility as well as contribute to attaining the Company objectives of developing and maintaining a viable, forest resource based business in Grande Prairie, the Company currently employs 30 managers in its Woodlands operation. Most of them have university educations in Forestry or Forest Engineering. Approximately 215 P&G employees, referred to as "technicians", perform almost all of the timber harvesting, road construction, timber management, and reforestation activities.

The Woodlands organization is divided into three major groups. Long term planning, reforestation, research and wood procurement programs are the responsibility of the Technical Services and Wood Procurement group. The second group, Engineering/Road Construction, handles all major road construction and road maintenance, as well as the evaluation of all types of harvesting and road construction equipment. The major responsibility of Operations, the third group, is to provide the pulpmill with a continuous supply of roundwood while meeting all commitments of the Forest Management Agreement.

2. Training

Procter & Gamble places considerable emphasis on the development of its technicians through thorough and intensive training. Sound training schedules for all technicians develop safe and productive work habits as well as an awareness of forest management principles, rules, regulations, and site-specific potential environmental problems.

Since a majority of the newly-hired technicians have little or no experience on heavy equipment, the initial training period is very important. The goals of this training are to provide the individual with the skills to do his/her job in a safe and productive manner. Trainers are fellow technicians who, through their work, have shown an ability to carry out training effectively with the proper emphasis on both safety and production.

Safety constitutes the most important introduction to P&G's logging practices. All employees are constantly reminded of safe working procedures, the effective use of all protective clothing and apparatus, and the potential seriousness of negligence or unsafe practices. An excellent safety record to date is proof of the effectiveness of this training.

Training does not end once a technician can operate one piece of equipment in a safe and productive manner. Operating skills for other equipment in the technician's specific work area are learned providing the technician with a broad range of skills and the Company with increased flexibility. Non equipment-related training is an important area in which technicians also develop. Areas included are extremely diverse, ranging from fire fighting to aerial photography.

While P&G recognizes a great need for training, economics dictate that production be maintained at a satisfactory level. Thus, one Company goal is to enhance training through the development of operational teams which include technicians with varying amounts of expertise in many areas. It is believed that this on-the-ground training from fellow workers can very positively complement structured programs.

PLANNING

Procter & Gamble's 20-year renewable contract (Forest Management Agreement) with the Province of Alberta, which is administered by the A.F.S. of the Department of Energy and Natural Resources, provides for the growing, harvesting, and improving of the forest resources of the Grande Prairie Forest. The F.M.A., on which the Company began harvesting operations in early 1973, is 5,600 square miles in size; 4,793 square miles are located south of Grande Prairie and the remaining 807 square miles are to the north in the Saddle Hills area. Land Holding and Fire Protection dues in excess of 130 thousand dollars are paid to the government each year for the privilege of leasing and protecting the wood fibre rights on this land; as well, prescribed stumpage charges are paid for each unit of wood harvested. Additionally, a provisional reserve area northwest of Peace River is set aside for use by the Company in the event wood consumption requirements increase.

The Forest Management Agreement very specifically enumerates the conditions under which the F.M.A. must be managed. A key condition of the Forest Management Agreement is that it ensures that this public land will be held in stewardship according to good multiple use forest management principles. Detailed short and long term plans must be prepared by the Company and approved by the A.F.S. for the Minister prior to harvesting. Major plans which are submitted to the government for approval include:

1) a detailed long term Forest Management Plan
2) an Annual Operating Plan (A.O.P.)
3) a Fire Control Plan
4) an Annual Silviculture Plan

In addition, other mutually agreed upon procedures which P&G regards as essential to proper management of the F.M.A. include:

1) a research program
2) use of forest biomass and wastewood material
3) consideration of other industrial users of the F.M.A.

All of the above plans are outlined in detail in Appendix II.

Planning is done from a pro-active point of view in that Company personnel try to foresee and prevent problems before they occur. Areas considered include operational parameters, potential environmental problems, appropriate safeguards, and the associated economics. Upon completion of a realistic and logical plan, approval is sought from the A.F.S. Until such approval is received, the operation does not commence.

Carrying out all the planning necessary for P&G's operation and the follow-up monitoring are major responsibilities of the Technical Services group's 6 professional foresters and their supporting technical staff. They interact very closely with Engineering/Road Construction, the Operating Districts and various governmental agencies to ensure that all plans are effectively administered and the public lands under stewardship to the Company are optimally managed. To provide resource data and aid in planning, a very well-equipped photo and mapping lab has been set up. Company-trained technicians, utilizing P&G aircraft, take and develop all requested aerial photography. Various cameras, pieces of related equipment, and modern techniques are also used to provide Company foresters with detailed, up-to-date maps and photos to aid them in managing the resource in a thorough and efficient manner.

OPERATING GROUND RULES

Whereas the broad scope of operations and planning is governed by the Forest Act and by all other Provincial Acts which regulate industrial activities on public land, the day-to-day activities on the F.M.A. and the A.O.P.'s are administered on the basis of the Operating Ground Rules. These Operating Ground Rules are a set of guidelines that are developed mutually by the Company and the A.F.S. specifically for the Procter & Gamble F.M.A., and are updated every 5 years to assure appropriateness. The topics covered in the Operating Ground Rules include:

1) planning and harvesting criteria
2) harvest layout including block size, etc.
3) merchantability standards
4) reforestation standards
5) watercourse management
6) stream crossings
7) road standards
8) gravel pits

This mutual approach used to establish the Operating Ground Rules is working satisfactorily for several reasons. All parties involved have inputs and are therefore joint owners of this system, rather than adversaries. While the formal review of the Ground Rules is carried out every 5 years, significant, mutually acceptable changes can be made in the interim. As an example, some rules regarding the protection of watercourses were altered mid-way through the initial 5 years of Company operation. Similarly, additional changes were introduced as a direct result of recommendations made in The Environmental Effects of Timber Harvesting in Alberta, a report prepared in 1973 for the

Government of Alberta by C.D. Schultz and Company, Ltd. In this manner, as new information becomes available, Company and A.F.S. foresters can develop the appropriate safeguards. One of the most important aspects of the Ground Rules is that they are to serve as guidelines and are not hard and fast rules to be used as substitutes for judgement or experience.

Administration of the Operating Ground Rules is a joint task of the A.F.S. and the Company. Periodically, Company and A.F.S. personnel hold discussions and schedule joint field trips to ensure agreement on interpretations of the Ground Rules. This continual testing for compatibility is essential if the Company is to properly train its personnel and effectively plan and carry out operations in a reasonable manner. On a weekly basis, A.F.S. personnel are in the field inspecting all aspects of the Company's operations to ensure that Company and A.F.S. interpretations are compatible. Company foresters work continuously with these A.F.S. personnel to optimize the effectiveness with which the forest is managed.

From an environmental standpoint, the Operating Ground Rules are invaluable because they are pro-active. For most conditions, the guidelines delineate acceptable practices and offer a standard against which the proposed practice might be measured. Watercourses provide an excellent example of how the Operating Ground Rules apply. All watercourses are classified and for each classification there are specific Watercourse Operating Ground Rules. All other areas of the Operating Ground Rules are treated in a similar manner.

Because the Operating Ground Rules are so extensive, they are very useful in training technicians to operate in a manner which minimizes environmental problems. At various times during the year, training/refresher courses are given to all technicians to explain the Ground Rules applicable to the individual's present position. Thus, those

technicians building roads learn the problems related to road construction while those in harvesting positions are trained in proper harvesting procedures from an environmental point of view.

The Operating Ground Rules are very beneficial as they provide a pro-active approach to protecting the environment. The Operating Ground Rules used in Alberta are very stringent, perhaps the most stringent in Canada, and more than safeguard the environment.

CONSTRUCTION OF LONG TERM ROADS

1. General Background Information

At a replacement cost in excess of 12 million dollars, Procter & Gamble has built approximately 200 kilometres of high-standard, all-weather roads since commencement of construction in 1971. Road standards are high to enable year-round hauls with 60 to 80 ton gross vehicle weight trucks. These standards are presented in detail in Appendix III.

In order to support operations of a long term nature, Procter & Gamble must continue to build approximately 25 kilometres of long term roads annually. It is important to realize that these roads are available for public use and thus offer the recreationist a multitude of opportunities including hunting, fishing, camping, and hiking. The improved access also makes it easier for the government to protect the forest from fire and disease.

2. Planning

Once long range harvesting plans have been developed, road location and construction priorities are consolidated into a 5-year plan. Road construction plans of government agencies such as the A.F.S. and Alberta Transportation and of other companies are then considered in an attempt to avoid unnecessary duplication of road systems.

3. Road Location

The road location process is essential in road construction from both an economic and environmental standpoint. Alternative routes are initially laid out using aerial photos and contour maps. Field crews then gather pertinent data relating to variables such as soil type, moisture conditions, and sideslopes.

Using all available information, a final route is chosen and a written application for approval is made to the Department of Energy and Natural Resources. Significant details are available as back-up for the application. Included are right-of-way width, size and number of borrow pits, salvage and clean-up procedures, drainage and erosion control plans, and a road profile. A.F.S. personnel, after studying the proposal, walk the location in the field with Company personnel to assess compatibility with the Ground Rules to ascertain any special problems which might exist. Final written approval from the A.F.S. details any special conditions which must be met in building the road. Additional information relating to the road location process can be found in Appendix IV. The final approved location is selected in a manner to protect the environment while providing a feasible route at reasonable cost.

4. Road Construction

Once approval is received for a road, significant additional planning is carried out to ensure adherence to the appropriate road standards. The objective is to minimize or avoid environmental problems in a cost-effective and pro-active manner.

The initial step in the actual construction of the road is cutting the right-of-way. Its width is pre-determined from the road design and factors influencing it include the number of large cuts and fills and borrow pits required as well as special environmental concerns. The use of borrow pits is minimized by utilizing suitable, available fill from the ditches. All merchantable, coniferous timber from these right-of-ways is salvaged and used by the Company.

The centreline is staked and stripping (the removal of undesirable, organic material and debris from the roadbed) commences with

tracked dozers. Subsequently, the centreline is re-staked and all other required construction data are indicated including cuts and fills, shoulders, culvert locations, ditch lines, etc.

In extremely wet areas, an effort is made to minimize potential rutting and erosion problems by building drainage facilities such as offtake ditches prior to the arrival of the main construction crew. In this manner, ground water can be drained from the right-of-way and the surface allowed to dry properly.

Building of the initial grade is accomplished in one of two ways; rubber-tired scrapers and crawler tractors are commonly used in the drier areas, while the tracked backhoe and crawler tractors complete the wetter portions. Self-propelled compactors follow in both methods to attain proper compaction of the base.

Considerable environmental damage is prevented by "finishing" a road. Important aspects include the following:

a) ensuring that road width, ditches, and side and back slopes are completed to design specifications

b) achieving final compaction

c) spreading strippings

d) installing drainage controls

f) applying gravel

g) seeding right-of-ways

Motor graders and compactors complement each other in finishing the actual roadbed. The graders shape the road and ditches to facilitate proper drainage while the compactors ensure a durable road of maximum bearing capacity. Crawler tractors spread the

organic strippings on the right-of-way and use them, when appropriate, to help prevent erosion on back slopes.

Proper drainage on a recently completed road is very important. Several techniques are used to slow down or decrease the flow of water in the ditches. The installation of ditchblocks is carried out to slow down the flow of surface runoff in the ditches and thus decrease the amount of erosion caused by the cutting action of silt-laden water. Once re-vegetation occurs, this problem is significantly reduced. Strategic placement of the ditchblocks provides water quality by minimizing the amount of silt entering the more permanent watercourses. Similarly, offtake and cross ditches move the water away from the bared area maintaining water quality and minimizing erosion.

The high percentage of clay found in all soils on the F.M.A. causes all roads to be very susceptible to rutting in wet weather. Thus, it is imperative that the initial gravel application be carried out as soon as possible after the road is completed. This application is meant to cap the road and provide a smooth surface which facilitates travel on the road while minimizing environmental concerns relating to the movement or non-movement of water.

The right-of-ways are seeded as soon as possible after completion of the road. Research was conducted to arrive at an acceptable grass/legume mix for the general soils and climate of the F.M.A. The seed may be spread by air or by hand depending on location and topography. On steep or unstable slopes, additional precautions may have to be taken to keep the seed in place and hold the soil until the grasses develop a suitable root structure.

A major problem area on these new roads is uncontrolled use by the public. While Company vehicles can be controlled to prevent the rutting of a new road in wet weather, the public cannot. Unfortunately,

a road left for completion in dry weather is often quite severely rutted in the interim and a considerable amount of time and money must be spent returning the road to its original condition for finishing. With present legislation, it is not feasible for the Company to limit this detrimental use. Government legislation to permit road closures during construction is required.

An additional related concern of the Company is that currently in Alberta the owners of private road systems do not have the liability protection afforded the provincial government, municipalities, and counties through the Highway Traffic Act. Since these private roads are open to the public, it is imperative that the government take action and provide equal liability protection to the road owners.

5. Bridge and Culvert Construction

A very significant portion of the Operating Ground Rules deals with crossing watercourses of all sizes. Therefore, an important part of the road construction program is the construction and installation of bridges and culverts. As soon as a location has been selected, planning commences to decide how all watercourses on the route will be handled. Working with the A.F.S. and the Fish and Wildlife Division of the Department of Recreation, Parks and Wildlife, Company personnel determine the size and type of structure required and then proceed to design it.

Small culverts placed at frequent intervals along the road are often used in place of fewer large culverts to minimize the build-up of large volumes of water in the ditches, since the amount of erosion caused by the movement of water is directly proportionate to the volume of water flowing. These culverts are usually installed in the summer to obtain maximum compaction and avoid

washouts and collapses. Offtake ditches are used as often as necessary to divert water from the right-of-way.

Consulting engineers and soil testing experts are used on all major culverts and bridges. In the planning process, potential environmental problems are outlined and conditions established to handle them. Prior to construction, government personnel review the plan to help ensure that all concerns are being raised and handled appropriately. The objective is to economically build a structure that results in protection to the environment. Bridges are generally built in the winter when frozen ground and low water levels greatly reduce the probability of erosion and detrimental effects to water quality. Small bridges (less than 60 feet in length) are built using treated timber piles, prefabricated crossbraced steel beams and a lumber deck. Major bridges incorporate steel piles, concrete abuttments, and precast beams and deck. The building of sound bridges such as these ensures safety and protects the environment at stream crossings.

Major watercourse crossings in sensitive areas should be handled very carefully. An appropriate example is the Red Rock Creek bridge approximately 120 kilometres southwest of the mill site. This creek flows through a large natural meadow varying in width from a few hundred metres to more than a kilometre. Recognizing the unique nature of this meadow, Procter & Gamble located its road to cross this creek at a narrow point in the meadow. In this manner, the aesthetics of the area were maintained and no major obstruction was presented to wildlife populations in the area. The stream itself is a high quality, fish-bearing watercourse. Recognizing this, great care was taken to minimize disturbances which would cause siltation or any other damage to the stream. As an example, the right-of-way was flagged at its boundaries and absolutely no one was allowed to move any equipment outside this area. As a result of the care taken in building this

bridge, objectives of all involved parties were met and the structure has been pointed out many times as an example of what can be done with proper planning and attention to details where the sensitive nature of the environment requires it.

6. Road Maintenance

A major area of responsibility related to the P&G road network is the maintenance of all roads. All main roads are graded on a scheduled basis to maintain a desirable crown and surface. Regravelling is carried out where necessary and special problems are dealt with as they develop. These can include restoration or replacement of ditchblocks, repairing slide areas and reseeding bared areas.

Because stream crossings can have considerable environmental impact if improperly maintained, semi-annual inspections are made of all culverts for failure, blockages or erosion problems. Inspections are also made for structural damage or erosion problems on all bridges.

7. Gravel

A minimum of approximately 300 cubic yards of gravel must be applied to each kilometre of main road and therefore it is imperative that large volumes of gravel be economically available to Procter & Gamble. Without such supplies, the feasibility of operating year-round at full employment levels is questionable. Unfortunately, all known gravel sources on the F.M.A. occur in the major river valleys and the extraction of this gravel presents environmental, wildlife, and recreational concerns. As the Company road network moves closer to the known gravel deposits, solutions will be developed that meet these concerns. While Procter & Gamble recognizes the potential problems related to other users of the

area, it is important to remember that problems can be solved and that a primary use of the F.M.A. is for timber production and the necessary associated activities.

8. Summary

Procter & Gamble has attempted to establish a road construction operation that recognizes and deals with concerns before they become problems. The Roads Standards developed with the A.F.S. are very thorough and deal with all aspects of road construction. The review process and close co-operation between the A.F.S. and Company personnel ensure that environmental damage is minimal and that new ideas will be tried and improvements will be made.

Training of Company technicians is another area responsible for preventing significant problems. The technicians' knowledge of environmental problems and their application of proper procedures during construction aid significantly in building roads that are environmentally sound, yet economical.

WOODLANDS OPERATIONS

1. General Background Information

The annual roundwood requirement of the pulpmill is currently about 700 thousand tons. A portion of this is harvested by a contractor in the Saddle Hills area, while the Woodlands Operations group is responsible for all harvesting on the remainder of the F.M.A. The balance of pulpmill raw material needs is met through an active program of purchasing sawmill wastewood chips, a by-product which was previously burned.

Geography and logistics dictate that Operations be divided into 2 independent harvesting groups. District I functions as a daily commuting operation out of Grande Prairie, and these employees are thus able to live at home throughout the week and participate fully in community activities. The second group, District II, is based at a large camp complex approximately 100 kilometres south of the millsite. The 4-day work week in effect at this location allows employees to spend more time at home with their families.

Year-round operations within Woodlands have a very positive effect on both the employee and the Company. The employee is provided with the security of a full-time job and the time and opportunity to develop, through a variety of training courses, an understanding of the entire operation. As a result, the Company benefits because technicians are better prepared and can critique methods and make meaningful changes towards a more effective operation.

2. Harvesting

(a) Cutblock Design

Cutblock design is perhaps the most important aspect of the entire harvesting process because it is at this stage that all operating parameters and the many potential problems

must be considered. Personnel involved in cutblock design are highly trained individuals knowledgeable in both operating procedures and the Operating Ground Rules.

Size and shape of cutblocks are determined by many factors including moisture conditions, slope, aspect, species, existing watercourses, wildlife considerations, water quantity and quality, aesthetics, reserve blocks, blowdown potential, harvesting system, and season of harvest. Each factor must be reviewed and priorities established. For example, moisture conditions in an area might prevent summer harvesting. Once this is recognized, many other factors become insignificant because they have little or no relevance in a winter operation. On the other hand, proximity of timber to a main road would suggest its designation as a summer block. All factors must then be reviewed in this light to determine the overall optimal block layout from both an economic and environmental viewpoint.

Examples of criteria outlined in the Operating Ground Rules also indicate the magnitude of planning required in cutblock design. Major and subwatersheds must be identified to meet the requirement that no more than 50 percent of any subwatershed be removed in any one cut. This is achieved by laying out blocks in a checkerboard-type pattern and cutting alternate blocks in the initial harvest. In this manner, the water retention attributes of the area are safeguarded. For this same reason, the "leave" blocks comprising the other 50 percent of the watershed cannot be harvested for 20 years or until regeneration in the adjacent cutblock is at least 6 to 8 feet in height. In potential blowdown areas, windfirm block boundaries are chosen to minimize this possibility. Considerable attention should be given to this topic, as the

salvaging of blowdown is an expensive and hazardous operation resulting in appreciably lower levels of resource utilization.

Specified reserve areas must also be left along streams and as game corridors in areas where wildlife surveys indicate substantial populations. The Ground Rules also specify maximum block sizes of 250 acres for pine and 90 acres for spruce. These are adequate to allow economical road location in summer blocks.

The magnitude of this entire cutblock design procedure is best summarized by pointing out that each year approximately 10,000 acres or 100 cutblocks are harvested over a total area of approximately 22,000 acres. The additional 12,000 acres consist of the leave blocks and reserves. Many man-months of co-ordination and planning are required to ensure that necessary volumes are allowed for and the woodflows are acceptable while all constraints are met.

(b) Harvesting Systems

Procter & Gamble utilizes a highly mechanized fleet of equipment for harvesting purposes. Important features of these machines include safety, ease of operation, and operator comfort. Equipment selection incorporates feedback of the technicians regarding operating as well as environmental concerns. Two basic harvesting systems are used; most prevalent is the feller-buncher and grapple skidder system. Used in small timber on flat terrain, the trees are cut and placed in bunches to be skidded to the landings with grapple skidders. High utilization is key to this system as stump heights are minimized with machine cutting heads, and the ability to bunch stems puts more wood in one place for the skidders. Environmentally, feller-bunchers, either tracked

or rubber-tired, are low ground pressure units and thus minimize ground disturbance and avoid disturbing sensitive areas and reserves by bunching the stems in the best location for skidding. The second system is shears/powersaw and cable skidders. Because trees are not bunched with this system, it is best utilized in larger wood where skidder productivity can be maintained at satisfactory levels. More sensitive areas can be logged with this system because the cable skidder can drop its payload and winch it across the area, minimizing rutting and potential erosion problems. Shears are mounted predominantly on crawler tractors and are most often used in winter conditions. In very large timber and on severe slopes, powersaw falling is common practice.

The method of delimbing and decking is common to both harvesting systems. Flail delimbers pass over the wood when it has been dropped by the skidders. This method is considerably safer than other methods of delimbing, as it requires no operators on the ground. Following delimbing, loaders move the wood to roadside decks.

(c) Roads and Landings

Many factors are considered in locating roads and landings in cutblocks. The key factor is which season the harvesting will occur in. Summer blocks present many more concerns because of the increased potential for environmental damage. They are usually close to major all-weather roads and larger in area to allow optimal road networks, since construction costs are much higher in the summer. Watercourses are avoided as much as possible and both roads and landings are located on the higher ground with the intention of placing a majority of the activity on the most environmentally sound areas. Skid trails are often used in the summer to forward wood to the

landings. Although these trails are potential problems, they tend to localize the disturbance, making it much easier to reclaim upon completion of harvesting.

Winter blocks present relatively few problems. Road construction simply requires moving the snow and smoothing the surface with crawler tractors while watercourses are easily crossed with snow and/or brush fills. The presence of large numbers of seismic cutlines on the F.M.A. significantly improves access and lowers costs as no right-of-ways have to be cut. Landings in winter blocks tend to be located throughout the block, resulting in a very widespread skidding pattern.

After harvesting is complete in an area, the short term roads are "retired." The windrows of organic material along these roads are spread over the bared surfaces to help retain moisture and decrease runoff. Additionally, steep slopes are cross ditched to prevent erosion caused by the movement of large volumes of water.

3. Summary

It must be recognized that present day harvesting practices are simply substitutes for those of the past. While early timber operations removed significant volumes of mature timber, the largest volumes were "harvested" by nature through fire and disease. This is worth remembering when one looks at a recently harvested cutblock and comments on aesthetics. The aftermath of a fire is seldom a pretty site. Through P&G's planned approach to harvesting, many values are recognized which might not fare as well under natural processes. Wildlife habitats are recognized and maintained, corridors are left to allow the protected movement of wildlife, and for some species, habitat is actually enhanced

through harvesting. Unfortunately, past "harvesting" techniques have created some problems. Extremely large areas of mature, even-aged forests of fire origin are now available for harvest. Over time, with proper forest management, a more uniform distribution of timber ages will be developed. As a result, some furbearing wildlife populations may be displaced from specific areas for a length of time. However, the numbers should remain constant.

Environmentally, the Operating Ground Rules and their application by the Company in the harvesting of Alberta's forests guarantee maximum consideration in all problem areas and minimal disturbances of any type. Decisions are being made by well-trained personnel, both technicians and managers, and tested thoroughly against the many standards.

REFORESTATION AND SILVICULTURE

1. General Background Information

Procter & Gamble has developed a very aggressive reforestation program to not only meet but exceed requirements established by the province. The initial stages of the program are implemented with planning even prior to harvesting.

Operating Ground Rules have also been established for reforestation. They cover such items as species and number of trees per acre that must be re-established and the time allowed for re-establishment. With these basic givens, the Company is then able to design, and modify as necessary, a reforestation program to assure compliance. Each year, a Silvicultural Annual Plan is submitted to the government for approval. Proposed plans, as well as results of previous years' programs, are included in the Plan. The objective is to meet or exceed government regulations requiring adequate restocking of cutover areas within 10 years of completion of harvesting in any cutblock.

Additionally, the Company, in co-operation with the A.F.S., has pledged to reforest one additional acre of currently non-stocked land for every four acres of harvested area. These additional acres consist of sites currently supporting no valuable tree species. They frequently originated from severe fires which eliminated the natural coniferous seed sources in the area. Approximately 7,000 acres have had initial reforestation treatment under this supplemental agreement as of the end of 1977. This commitment not only assures a continuation of present productive capacity, but also increases future yield from the forest land base.

2. Computer Information System

To ensure that silvicultural decisions are made on sound, objective data, P&G has spent considerable time in the development of an intensive information system using the cutblock as the basic unit. All data with respect to a cutblock can be incorporated into the data base. This includes harvesting and hauling information, survey data, procedures used in re-establishment, results of trials, and any additional, significant information.

The long term nature of forest management necessitates the collection of an astronomical amount of data. For this reason, the entire system is computerized and thus allows complicated sorts and comparisons to be made in seconds. This ease and the availability of all relevant data at any time will be invaluable tools for management throughout the rotation.

3. Techniques

Various surveys are the basis for important decisions in P&G's reforestation program. A post cut survey, conducted after harvesting, supplies data with respect to drainage, soil type and texture, slope, quantity of debris left after cutting, degree of exposed seed bed, seed source, stump heights, duff depth and advanced growth. Additional surveys of the same intensity are made on growth monitoring plots, regenerated cutblocks, and stands which have not yet been harvested.

Depending on the results of the post cut survey, various regeneration techniques are employed to obtain satisfactory restocking. These can be broadly classified into scarification and natural seeding, scarification and artificial seeding, planting containers or bare root stock with site preparation, planting containers or bare root stock without site preparation, and natural

regeneration. Although Procter & Gamble's reforestation program commenced only 3 summers ago (in 1975), the results to date are very encouraging. Six hundred acres which were treated in the summer of 1975 were surveyed for regeneration in the fall of 1977 and found to be satisfactorily stocked according to government requirements. This is a full 5 years less than the re-establishment period currently allowed. Results on monitoring plots throughout subsequently treated areas are also favourable and indicate that the particular methods being employed on various sites will probably exceed required standards.

In a majority of the cutblocks, scarification of some type is necessary before restocking can occur. To date, the Company has typically scarified pine blocks using large crawler tractors with plows and drags; spruce blocks have been site prepared by brush raking. These techniques have worked very well and the precautions taken such as scarifying on the contour and avoiding watercourses have resulted in very few environmental concerns. However, recognizing that minimal disturbance to the cutblock is most beneficial from an environmental viewpoint, trials are currently underway to assess the practicality of more site-specific equipment. Additional detail with respect to survey and site preparation techniques may be found in Appendix V.

4. Cone Collection

In order to ensure that a sufficient supply of seed and nursery stock is available, the Company has cones collected manually. Once the cones are collected, the seed is extracted by the Company and/or the A.F.S. and stored in a controlled environment until it is required by the Provincial Tree Nursery to grow either container or bare root stock, or until a direct seeding program is being carried out. An appropriate supply of seed is essential for a successful reforestation program and in light of this, the

Company has a 4 to 5 year supply in inventory. This requires the annual collection of approximately 2,000 bushels of white spruce cones and 5,000 bushels of pine cones.

In summary, reforestation is the essence of any sustained yield forest management plan. In a managed forest, the removal of mature timber is a planned and managed function avoiding the catastrophic consequences of the natural harvesting agents such as fire and disease. Reforestation is the facility through which we can ensure a lasting, healthy forest resource for future populations in perpetuity. To date, P&G's results indicate that the required new crop is being established and will continue to be enhanced as the Company, in concert with provincial, federal, and other forest company personnel, develops improved techniques.

CONCLUSIONS AND RECOMMENDATIONS

In summarizing the foregoing presentation, the Company offers the following conclusions and recommendations, not necessarily in order of importance:

Conclusions

1. The current policy of issuing long term forest tenure to timber operators in return for firm guarantees on the use of sound, sustained yield forest management practices, which include specific reforestation commitments, is a proper method of ensuring the continued protection and enhancement of Alberta's renewable forest resource.

2. The Company has made a major economic impact on Grande Prairie and the surrounding communities. Recognizing this, Procter & Gamble is committed to providing year-round employment opportunities for all personnel.

3. Procter & Gamble strongly endorses the multiple use concept of forest management as the correct approach to maximize the benefits of Alberta's forests for all parties.

4. The Company will continue to place emphasis on pro-active planning as an essential element in the prevention of environmental problems.

5. The "Operating Ground Rules" mutually developed by the Company and the province ensure that all aspects of operations are considered prior to their implementation and that all parties involved have a clear understanding of the expected results.

6. The Company believes that training of the personnel is key to operating in a manner which protects the environment and to this end has adopted a management philosophy that incorporates on-going training and development for all personnel.

7. P&G's approach to road construction ensures that many alternatives will be reviewed, and that the chosen route will protect the environment within economic constraints.

8. To minimize environmental damage, the road construction techniques used are specific to actual sections of the road being built.

9. The cutblock layout criteria used by Procter & Gamble ensure that all aspects of the environment are considered including water quality and quantity, fish and wildlife, and aesthetics.

10. Current mechanized harvesting practices, coupled with proper operator training are aimed at protecting the environment. These practices will be continued and enhanced as technology and economics permit.

11. P&G's reforestation program, which is complemented by Company, government, and forest industry research, has been very successful. This continued progress in reforestation, together with proper forest management techniques, will ensure forests for future generations of Albertans.

Recommendations

1. No major changes should be made to Alberta's policies on the issuance of long term forest management agreements.

2. The government has more than adequately responded to public concerns for single use areas, thus no additional single purpose zoning of large areas of the Eastern Slopes should occur.

3. More emphasis must be placed on employing multiple use criteria as the best way to maximize the forest benefits for all concerned. Education of the general public in multiple use forest management is an essential part of this process.

4. No major changes should be made in the existing Operating Ground Rules procedures.

5. To prevent unnecessary environmental damage, legislation should be enacted to permit closures, when necessary, on sections of road under construction.

6. The government should take action to provide the same liability protection to companies who hold Licenses of Occupation on roads as the government and municipalities have for roads they construct or have responsibility for.

7. The A.F.S. must have adequate, well-trained staff and sufficient resources to work effectively with industry to ensure the continued protection and enhancement of Alberta's renewable forest resource.

8. The Alberta forest industry currently operates under some of the strictest environmental controls in Canada. There is no evidence that additional major environmental regulations are needed or should be imposed on the forest industries. (No additional major constraints are necessary or should be imposed on this industry, as this will only worsen the already disadvantageous competitive position of the Alberta and Canadian forest industry in world markets.)

APPENDIX I

EFFECTS OF THE PULPMILL ON THE ENVIRONMENT

A major concern to P&G is that the waste products resulting from mill operation be treated properly to avoid harmful effects on the environment. The Company has publicly pledged to meet or exceed the stringent air and water quality standards established by the Alberta government.

1. Maintaining Air Quality

The Grande Prairie mill employs recently-developed odor control equipment which greatly reduces the odor commonly associated with older kraft pulpmills.

The air pollution control measures are believed to be as extensive as any installed in a North American kraft mill. Odor control measures include a "reduced odor" recovery boiler system plus incineration of odorous vent gasses from the mill's digester, evaporator, washers and "black liquor" storage tanks. The black liquor is a solution recovered from the pulp cooking process and can be a source of "rotten egg" odor if not properly handled.

The recovery boiler which burns concentrated black liquor is continuously monitored to measure odor-producing compounds in the flue gas. Gasses from the boiler pass through an electrostatic precipitator which cleans the gas of particulate emissions (such as particles of ash). The precipitator is designed to be more than 99 percent effective in removing these particles during normal operations.

Particulate emissions from the mill's combination bark and natural gas boiler are collected in a two-staged mechanical collector which operates at a normal full load efficiency of 95 percent.

2. Maintaining Water Quality

Before construction, engineers carefully studied the Wapiti River and designed a waste treatment system that would protect this river. Internal processes re-use water many times over to reduce the volume of water used, thus reducing the amount of waste water.

Two basic types of waste water are associated with the pulp-making process.

The first has a high content of suspended solids, primarily wood fibres which are too small to be screened during the pulp-making process. The second type consists of wood solids in solution which has a high biochemical oxygen demand (BOD). This type of waste water results from cooking and processing the wood chips and pulp. BOD materials can consume too much oxygen from water in the river, therefore, the quantity of BOD discharged must be carefully controlled.

3. Water Treatment System

BOD materials and suspended materials are removed in a large waste treatment system covering about 50 acres and utilizing both primary and secondary treatment.

Removal of about 95 percent of the settleable material and some BOD removal occur in the primary step, using a large circular clarifier. The material removed in this step is dewatered and disposed of by land-fill.

Secondary treatment is carried out by biological treatment in two large aerated lagoons. This process, involving a long treatment period, is designed to provide 90 percent removal of BOD from the waste water. A special settling area following the biological treatment section collects solids produced in secondary treatment and prevents them from entering the river.

Special basins and tanks intercept spills or unusual waste loads resulting from unexpected changes in the manufacturing process or equipment failures.

Continuous monitoring of the waste treatment operation provides an instant alert if any malfunction occurs. Also, waste materials entering the waste treatment facility are monitored and diverted to storage if necessary to prevent any upset to the treatment operation.

As a result of this extensive waste treatment operation, no harmful effect on the Wapiti River results from the operation of the P&G mill.

APPENDIX II

MAJOR PLANNING ACTIVITIES

1. Forest Management Plan

Initially, a preliminary management plan was presented to the government which allowed for provisional operations while a detailed Forest Management Plan was being prepared. The detailed plan, approved by the government in January of 1978, describes the methods that the Company will follow in managing the F.M.A. on a sustained yield basis for the first rotation (80 years). The forest management goals specified in this plan are:

(a) to supply a relatively uniform flow of fibre in both species and quality to the pulpmill in perpetuity;

(b) to reforest more land than is actually cut over;

(c) to develop an economical, logical, and systematic plan of road building and timber harvesting operations on the F.M.A.;

(d) to maximize fibre growth on the present forest by harvesting the slowest growth stands first, wherever possible, while maintaining consistency with all other objectives;

(e) to maximize the fibre-growing efficiency of the forest;

(f) to minimize the impact of the Company's operations on any given watershed by spreading the harvest over many watersheds;

(g) to protect and enhance other forest land values such as recreation, wildlife, aesthetics, etc.

(h) to maintain long term harvesting operations that provide commuter-type employment for local residents in both District I and the Saddle Hills area.

Approximately 20 to 25 man-years of field surveys and statistical workup were required in preparing this plan. Extensive files of forestry information, the majority of which were collected through detailed field cruises of the F.M.A. during the summer months of 1971 through 1975, are stored on computer.

The Forest Management Plan will be reviewed at least every 10 years or sooner if conditions change or better data become available. A Ten Year Development Plan is also submitted annually to the government. The Company maintains several on-going inventory programs to monitor changing conditions of the forest and ensure that revisions are based on updated, objective data.

2. Annual Operating Plan

Each year, an A.O.P. is submitted to the government for approval prior to the commencement of operations in that year. The A.O.P. indicates precisely where roads and cutblocks are planned for a 1-year period, with tentative projections for an additional 2 years. This short term plan and projection fit in closely with the long range planning of the Forest Management Plan. As well, the Company's planned activities in the areas of reforestation, forestry research, forest protection, photography and mapping, and recreational site development are defined in the A.O.P.

3. Fire Control Plan

Fire protection is a basic responsibility of the government, which the Company pays for annually through a fire protection charge. Procter & Gamble's responsibilities are supportive in nature and are outlined in a Fire Control Plan submitted to the Forest

Protection Branch of the A.F.S. prior to the start of each fire season. This plan helps to co-ordinate the government's and the Company's roles in the area of fire protection, and shows the detailed organization of:

a) the Company's available manpower

b) the distribution of fire fighting equipment

c) the communications system

d) aircraft and patrolling

e) the Company's fire training program

f) the fire duty roster and other supporting data

On an annual basis, key Company personnel are given fire training courses to facilitate formation of several appropriately trained standby fire fighting crews. To date, this sytem of fire protection has been very effective.

4. Forest Research

The Company has a research forester on its staff who is responsible for all forest research programming and his efforts are divided into 3 phases:

a) Secure Successful Regeneration
   - optimize site treatments
   - timing of treatments
   - seed production areas

b) Improvement of Tree Growth
   - plus tree seed orchards
   - tree breeding
   - forest fertilization programs

c) Improvement of Fibre Quality
  - specific gravity
  - fibre strength
  - commercial extractives

5. Other Industrial Land Uses

The Department of Energy & Natural Resources reserves all land rights on the Management Area for the following industrial uses:

a) geological and geophysical exploration;

b) harvesting timber for local use in construction and maintenance of public works and for local farmers' own use when other timber is not available;

c) grazing leases, permits and licenses.

The major concern with respect to other industrial land uses is the lack of "ownership" on the part of such users because of the short term nature of their stay. Thus, it is often difficult to attain the levels of compliance to the Ground Rules equivalent to those of a long term user.

6. Wood Purchase Planning

In order to maximize the utilization of the Province's wood fibre reserve, the Company has been actively engaged in a wood procurement program for the past 5 years. This program involves utilizing fibre that previously was considered to be uneconomical to salvage or to use. The five most active areas of this program have been:

a) Wastewood Chips:

The Company has encouraged sawmills within economical hauling distance of the pulpmill to install necessary chipping equipment to produce wastewood chips. The results have been beneficial

to all parties, however, the lumber industry is extremely cyclical and thus a high degree of confidence cannot be placed on acquiring the annual volume of chips that is theoretically available.

At the current time, the Company is purchasing approximately 190,000 bone dry units of chips annually from within Alberta, up to a distance of 300 miles from the Grande Prairie pulpmill. Alberta mills currently selling chips to Procter & Gamble include North Canadian Forest Industries, Swanson Lumber, Simpson Timber, Zeidler Forest Products, and Buchanan Lumber.

b) Private Land/Permits:

The potential annual wood volume supply from these sources is relatively minor and highly dependent upon other economic factors in the area. However, in 1976-77, the Company purchased 17,000 tons of roundwood from these sources, and it appears that a reasonable volume will also be available in 1977-78.

c) Geophysical and Road Right-of-Ways:

All merchantable timber from all Company road right-of-ways is salvaged and whenever possible, the Company purchases the salvaged wood from geophysical exploration activities.

d) Roundwood Exchange and Sale:

In order to better utilize the coniferous volume on the F.M.A., the Company, in compliance with Section 21 of the Forest Management Agreement, has carried out exchanges of high quality sawlogs and peeler material for small pulpwood-sized material. Also, straight sales of high quality material have occurred.

e) Hog Fuel:

The Company has recently negotiated a long term contract to purchase and utilize hog fuel (bark, sawdust and other waste from sawmills) for the generating of power at the pulpmill starting early in 1978. This greatly reduces the amount of fibre that is burned at the sawmills, and is a more efficient utilization of all woody fibre. In addition, this system reduces the consumption of non-renewable fossil fuels.

APPENDIX III

ROAD STANDARDS

1. Location

   a) Gradient - grades shall be kept to a minimum wherever possible.

   b) Reserves along watercourses and lakes.

   c) Flood Plains - Wherever road construction is proposed on a flood plain (areas frequently subject to flooding which may or may not contain sensitive soils), the A.F.S. and Procter & Gamble will mutually determine whether or not alternative routes are available. When it is agreed that an alternative route is not available, construction employing maximum erosion prevention measures will be allowed. At any time after construction has been completed, should any problems occur in the damage to the watercourse caused by the Company's negligence in building or maintaining the road, Procter & Gamble must take immediate action towards rectification.

   d) During the second cut, roads shall be located to provide the minimum disturbance to the established regeneration on the initial cutovers.

2. Construction and Maintenance

   Right-of-way widths - Other than in approved cutblocks where the right-of-way is prelogged in advance of construction, right-of-way widths shall be no wider than is necessary for construction of the specified class of road (as in Table I). On any right-of-way, the surface that is bared to mineral soil shall be kept within the limits specified by Table I, unless otherwise approved. The limits stipulated in Table I are applicable only on level ground, and it is recognized that reasonable increases above the limits stated in the table will be necessary under adverse topographic conditions.

3. Brush Disposal

a) Debris disposal shall be as specified, and conducted in accordance with the requirements of the Forest Protection Regulations.

b) Brush shall not be buried along sides of right-of-ways so as to create mounds.

c) Where debris is to be buried on a right-of-way, it shall be buried and compacted underneath the original surface, preferably under the road grade.

4. Road Drainage

Proper drainage shall be incorporated into road construction to minimize erosion on the road surface, on the cut and fill slopes, or in the ditches.

NOTE: In order to achieve this requirement, the following will be required in many instances:

a) Frequent culverts, off take slopes and ditches to minimize water movement along ditches and road surfaces.

b) Drainage structures should be of sufficient size to accommodate yearly peak flows from the drainage area and ensure healthy fish passage.

c) No ditches shall drain directly into watercourses (except draws and minor intermittent) unless limited by topography and approved by a Forest Officer. Ditch blocks to be installed where required.

d) Special erosion control measures may be required on fills or cuts greater than 20 feet to reduce bank erosion, including such measures as contour trenches or terracing.

e) Culverts shall be rip-rapped as necessary, to prevent erosion at both inflow and outflow ends.

f) The outflow ends of hanging culverts will be provided with down spouts or other suitable drains, where necessary. Rock or concrete aprons shall be provided to decrease water velocity and prevent stream channel gouging.

g) No significant stream diversion shall be constructed unless approved under the Water Resources Act.

h) Culverts or other drainage devices should be placed at an angle to the road so as to attain maximum drainage efficiency.

i) Culverts will be installed to allow for the passage of healthy fish.

5. Cross Sections

a) Except on rock cuts, cut and fill slopes shall be as specified in Table I.

b) Road slopes shall be regular in profile from the top of the cut to the bottom of the ditch, with no hanging banks and no sharply cut ditches.

c) On unstable back slopes, timber shall be removed for a distance back from top of cut. Where this distance is excessive, it shall be determined by conditions and approved by a Forest Officer.

6. Road Maintenance

All roads shall be maintained in such a manner to allow proper drainage and to prevent erosion.

7. Landings

Where applicable, the requirements for location, drainage and revegetation of landings shall be the same as those for roads.

8. Retirement and Restoration

Studies have shown that erosion and sedimentation are most serious during and immediately after construction. Detrimental effects can, however, continue or even increase as the road ages, unless corrective measures are taken.

a) Bared surfaces on roads in use other than the travel surface shall be subject to re-vegetation. Re-vegetation means a herbaceous cover adequate in density to minimize erosion. It may also include seeding to restore coniferous tree growth on areas where there is a minimal erosion and sedimentation hazard. Establishment of this cover may require, aside from seeding, fertilizing, mulching, contour trenching or other means of slope stabilization.

b) Erosion treatment is to be applied in conjunction with primary construction for each section of the road. Where timber is skidded to the road, treatment will be applied after the hauling program.

c) Roads which will not be used will either be "put to bed" in a manner which will minimize erosion or given maintenance for drainage and erosion prevention so that no significant erosion will occur.

d) In drainage patterns where filter strips are employed which do not effectively retard sediment movement, a system of obstruction (i.e. logs, rocks, mounds, etc.) placed between the drainage outlet and watercourse will be employed.

TABLE I

UNIFORM ROAD CLASSES

CLASS I (Trunk)	That portion of the road system over which wood flows from the District to the mill. This is a permanent road, constructed in such a way that they are usable year-round and will serve as the main access to a District. The term of the road is 20 years plus.
CLASS II (Secondary)	Permanent branch roads are constructed in such a way that they are generally usable 10 months a year and serve as access between the operating units and trunk roads. The term of the road is approximately 10 years.
CLASS III (Tertiary)	Permanent haul roads generally connecting a series of cutblocks to the Class I or II within an operating unit generaly usable during dry periods. The term of the road is 3 to 20 years.
CLASS IV (Temporary-Summer)	Temporary non-capital roads within or between cutblocks usually serving one year's operation with limited access during wet periods.
CLASS V (Temporary-Winter)	Temporary non-capital roads within or between cutblocks usually serving one winter season.

TABLE I

ITEM						
RECOMMENDED DESIGN		I	II	III	IV	V
Maximum horizontal curvature		10	10	20	--	--
Minimum sight distance *		600'	475'	350'	--	--
Maximum favourable grade		6%	10%	10%	--	--
Maximum adverse grade		4%	7%	8%	--	--
Travel surface width *		32'	24'	18'	18'	18'
Right-of-way width *		150'+	150'	-100'	80'	80'
Maximum Bared width level ground	NORM Incut: Infil:	80 80 + 4C 32 + 4F	52 72 + 4C 24 + 4F	40 36 + 4C 18 + 4F	40 36 + 4C 18 + 4F	20 36 + 4C 18 + 4F

TABLE I

(cont.)

RECOMMENDED DESIGN	I	II	III	IV	V
Fill slopes - Normal *	2:1	2:1	1.5:1	1.5:1	1.5:1
- Sensitive *	3:1	3:1	--	--	--
Cut slopes *	2:1	2:1	1.5:1	1.5:1	1.5:1
Ditches - width *	12'	12'	"V"	"V"	"V"
- depth *	3'	3'			
Turnouts:		2,600'			
a) average spacing	--	On critical curves & hills	1,000'	At critical points	At critical points
b) length	--	200'	120'	--	--
c) width	--	10'	10'	--	--

*Field approval will be given to increase the right-of-way to 200 feet, providing the road is surrounded by 60 feet or higher trees of B Crown closure or denser.

APPENDIX IV

ROAD LOCATION

The first step in road location planning is establishment of long range road network requirements from harvest sequencing information provided by the Technical Services group of P&G Woodlands. Within the harvest sequence areas, harvesting personnel provide information on when harvesting will commence and the major road requirements. Using this information, road location and construction priorities are developed into a 5-year plan. At this stage, the road construction plans of government agencies such as the A.F.S. and Alberta Transportation and of other companies are taken into consideration in an attempt to avoid unnecessary duplication of road systems. Upon completion, the 5-year plan allows data collection, planning and budgeting for required roads in a logical sequence.

The road location process is aimed at gathering the maximum amount of information to select the best possible route from an economic and environmental point of view. In the preliminary selection of routes, some of the information sources used are:

1. 1:50,000 topographic maps. At major river crossing sites, special contour maps with a scale of 400' to 1" and a 10' contour interval are prepared from recent aerial photography.
2. Alberta Soil Survey maps are used to indicate surface soil types along the proposed routes. A rating of erodability and suitability for road construction has been prepared for each soil type.
3. Alberta Forest Service Cover Type Maps are used to determine existing vegetation types which can be indicators of soil moisture conditions.

4. Recent aerial photography at 4" or 2" to the mile is provided by the Technical Services group. Company aircraft are also used for low level photography and general reconnaissance of proposed routes.
5. Information on environmental sensitivity provided by the Land Use Section of the Department of Energy & Natural Resources is used to evaluate proposed locations.

Additionally, centreline profiles, sideslopes, soil types, and moisture conditions are determined by field location crews.

Proposed roads are first indicated to the A.F.S. in the A.O.P. For roads to be built in the current year, road class, length, and final location are shown on a Forest Cover Map. For roads to be built in the following year, road class, approximate length, and preliminary location are given. Normally, these roads are within one section of their final location. Approximate locations are shown for roads beyond this 2-year period based on preliminary information. Final location may vary widely from that indicated.

After a final location is determined, a written application for approval is made to the Department of Energy & Natural Resources. This submission includes a cover type map and aerial photos showing the final location, proposed culvert sizes for major culverts, the expected tenure of the road, the road standards as outlined in the Operating Ground Rules, and any special conditions or deviations from the Ground Rules. The proposed location is then walked in the field with A.F.S. personnel to facilitate discussion relating to culvert sizes, special erosion control measures and other concerns. If mutual agreement is reached on the proposed location and standards, written approval from the A.F.S. follows, specifying conditions applying to right-of-way width, borrow pits, salvaging and clean-up. For roads which involve crossings on major rivers such as the Kakwa

River, the submission is presented to the Highway Referral Committee for assessment by several government agencies. Considerably more information is supplied with submissions of this type.

Following construction of the road, P&G normally applies for a License of Occupation which gives the Company responsibility for road maintenance and control of other industrial users while allowing public access.

APPENDIX V

REFORESTATION AND SILVICULTURE

1. Post Cut Surveys

The reforestation techniques employed by Procter & Gamble to ensure adequate restocking of harvested areas encourage and promote success of the natural regenerative processes under way in the forest. Trees grow on a wide variety of site conditions and each tree species usually reacts predictably to a given set of site factors. Therefore, a detailed assessment of each harvested unit is necessary to measure those factors and determine those that are limiting to the establishment of a new forest.

A post cut survey (systematically spaced sample plots throughout the blocks) is conducted to determine drainage, soil type and texture, slope, quantity of debris left after cutting, degree of exposed seed bed, seed source, stump heights, duff depth, and advanced growth. All field data is then processed by computer which presents the final data in the form of overlay maps and graphs. From these surveys, the silvicultural foresters are able to prescribe the treatments necessary to ensure adequate restocking of the site within the shortest possible time period. Approximately 7,000 acres were post cut surveyed in 1977.

2. Site Preparation

One block characteristic measured during the post cut survey which may be limiting to the natural establishment of seedlings is the degree of creation of a suitable seed bed. Oftentimes an insufficient seed bed is caused by the deep accumulation of surface debris which can act as an inpenetrable barrier between

the seed and the required rich mineral soil below. This accumulation of material, called duff, is a natural process and is formed in all plant communities.

Where it is necessary to artificially prepare an appropriate seed bed after harvesting has been completed, the Company has used two major mechanical techniques:

(a) D-9 Scarification:

This system has been used mainly in lodgepole pine blocks where it is necessary to mix the surface debris with the mineral soil and distribute the cone-laden branches into the artificially created seed bed. The Company employs large tracked tractors with specially designed plows "up front" and pulling heavy anchor chain drags "behind" for this scarification work. Where light debris is encountered, only the heavy drag need be used. Scarification is carried out recognizing the possibilities for erosion and minimizing these to the fullest.

(b) Brush Raking and Blading:

These systems involve windrowing the debris and humus and/or mixing it with the mineral soil to create optimal conditions for the planting of spruce nursery stock or for the direct seeding of spruce seed.

P&G is currently experimenting with several new pieces of site preparation equipment. These units (a Marttiini plow, a Breche scarifier, and a TTS trencher) will permit the Company to carry out more specific site preparation treatments which will enhance the survival and performance of new seedlings.

Through the post cut survey data, it is determined which of the above techniques is appropriate. However, it is not always necessary to use a mechnical system, as the natural site after harvesting is occasionally sufficiently "prepared" as a suitable seed bed.

Area Site Prepared

	1976	1977	Full Allowable Annual Cut*
Natural after Harvesting	500 acres	800 acres	2,000 acres
D-9 Scarification	4,600 acres	3,200 acres	8,000 acres
Brush Raking/ Blading	4,100 acres	5,400 acres	8,000 acres
	9,200 acres	9,400 acres	18,000 acres

*Includes supplemental program acreage.

In most lodgepole pine blocks, the new forest is introduced to the seed bed by means of natural seeding and the only treatment is scarification with the D-9's. Lodgepole pine is a prolific seed-producing species with major seed crops developing every 1 to 3 years, and light crops usually being produced in the intervening years. Where the post cut surveys indicate that more seed is required, it is introduced to the site by aerial or hand application.

Most of the white spruce blocks have been treated either by aerial seeding or by hand planting spruce nursery stock following site preparation with brush rakes.

Treatment Statistics (Including Supplemental)

	1976	1977	Full Allowable Annual Cut
Natural or Only D-9 Scarification	5,100 acres	4,100 acres	9,000 acres
Aerial Seeding	2,800 acres	3,350 acres	2,000 acres
Hand Seeding	--	650 acres	1,500 acres
Planting*	1,300 acres	1,700 acres	6,000 acres

*Planting is currently at a rate of 550 to 600 trees per acre.

3. On-Going Surveys

The Company is establishing monitor plots annually which will provide very important survival, ingrowth, and germination data. These will improve the decision-making process and will assure optimum stocking and density of regeneration in future silvicultural work.

4. Regeneration Surveys

Silviculturally, a spruce tree has to have occupied a site for 3 years (2 for pine) before being considered a viable, healthy, established seedling. A regeneration survey must be carried out by the Company by the 7th year from the completion of harvesting following a procedure established by the government to determine actual stocking levels. If the site is not sufficiently stocked, the Company must plant that site within the year.

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